through the sheath until the tip is beyond the ligament of Treitz.

The endoscopic technique requires the placement of an endoscope in the stomach. A puncture is made and the wire is grasped and removed through the mouth. A long tapered catheter is then fed over the guide wire and exits the anterior abdominal wall at the puncture site. All systems work well with a low rate of complications. The endoscopic technique is somewhat more expensive due to the need for an endoscopy.

A percutaneous gastrostomy can be done on an outpatient basis and, after a short period, oral and enteral feedings can begin. If the gastrostomy is no longer needed, it can simply be removed.

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New Developments in Contrast Media

THREE LOW-OSMOLALITY CONTRAST AGENTS have recently been approved by the Food and Drug Administration. These agents are nonionic media iohexol (Omnipaque, Winthrop-Breon Laboratories) and iopamidol (Isovue, E.R. Squibb & Sons, Inc) and the dimeric media ioxaglate meglumine and ioxaglate sodium (Hexabrix, Mallinckrodt, Inc). These substances differ from the current ionic media in that there is about a third of the osmolality per given iodine concentration (degree of radiographic opacification). Thus, hyperosmolarity-induced reactions to contrast media are lowered with the new agents. Side effects attributable to hypertonicity include hypervolemia; deformity of erythrocytes; damage to vascular endothelium with consequent activation of blood coagulation, the complement system and fibrinolysis; increased release of bradykinin and histamine; cardiac arrhythmias; diuresis; vasodilatation and decreased blood pressure; pain, and heat sensation. All of these reactions are significantly decreased with the new low-osmolality contrast agents.

Contrast media also possess intrinsic molecule-specific properties that may be toxic. When the chemotoxic effects of the new contrast agents are compared with conventional ionic agents, a close correlation exists between systemic toxicity, as measured by the median lethal dose (LD_{50}), and enzyme (acetylcholinesterase) inhibition and protein binding. The protein-binding capacities of contrast agents can be expressed in ratio form as iothalamate: ioxaglate: iopamidol: iohexol = 4:3.5:1.5:1. Iohexol, with the lowest protein-binding capacity and enzyme inhibition, also has the lowest systemic toxicity as measured by LD_{50}. Chemotoxicity may play a role in such side effects as vasodilatation and flushing, bronchospasm and urticaria.

Conventional contrast material can produce acute renal insufficiency. The incidence varies from 0.6% with intravenous procedures to 2% for angiographic procedures. Patients with preexisting renal disease are at increased risk for contrast media-induced nephrotoxicity. The new low-osmolality agents in theory should produce less renal damage. A few reports have shown less renal toxicity, as measured by enzymuria, with iopamidol and iohexol as compared with conventional ionic agents.

The low-osmolality agents have less hemodynamic and electrophysiologic effects when injected into the heart compared with conventional agents. In the pulmonary circulation, the low-osmolality agents produce less elevation of pulmonary artery blood flow and pressure compared with conventional ionic agents.

Iopamidol has been shown to produce half the histamine release of diatrizoate. Nausea and vomiting and urticaria occur more frequently with the use of ioxaglate compared with iohexol and iopamidol. The newer contrast agents have not been used long enough to evaluate the incidence and severity of reactions. In Europe where these agents have been in use longer, there are some data accumulating indicating that rates of minor, moderate and severe reactions are less for nonionic media. Again, the small number of cases limits the conclusions that can be drawn.

At present the new low-osmolality agents are ten times more expensive compared with conventional ionic agents. The new agents should be used selectively in patients known to have an increased risk for reactions.

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